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10/073,628	02/11/2002	Douglas N. Kimelman	YOR920020022	4524

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Casey August  
Intellectual Property Law Dept.  
IBM Corporation  
P.O. Box 218  
Yorktown Heights, NY 10598

EXAMINER
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RAMPURIA, SATISH

ART UNIT	PAPER NUMBER
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2191

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/073,628	Applicant(s) KIMELMAN ET AL.	
	Examiner Satish S. Rampuria	Art Unit 2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 February 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 13-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Response to Amendment***

1. This action is in response to the Amendment received on 02/22/2007.
2. The rejections under 35 U.S.C. §112 second paragraph to claim 13, 14, 17, 19, 20 and 22 is withdrawn in view of Applicant's amendment.
3. Claims cancelled (previously) by the Applicant: 1-12.
4. Claims pending in the application: 13-24.
5. In view of applicant argument/comments that Bates is a patent owned by the Applicant, International Business Machines Corporation at the time the invention was made, thus Bates should not be used under 103 rejections. Therefore, the new ground of rejection to claims 13-24 is provided below.

***Response to Arguments***

6. Applicant's arguments filed 02/22/2007 have been fully considered but they are not persuasive.

In the remarks, the applicant has argued that:

Bates does not disclose such "components." Rather, Bates determines a cost for each function of an object. It does not teach interaction between components or measuring the cost of such interactions. Moreover, the components of Bates are not characterized by string representation and data structure. Therefore, independent claims 13 and 19 are not anticipated by Bates. Claims 14, 16, 20 and 22, as the dependent claims of claims 13 and 19 are therefore not anticipated by Bates for at least the same reasons that their parent claims are not anticipated by Bates.

Examiner's response:

In response to Applicants argument that Bates determines a cost for each function of an object not components. However, the specification describes that in the

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context of present invention, "object", "entity", and "component" shall be interpreted as having substantially the **same** meaning (Applicant's Specification page 3, lines 1-3).

Further, Bates does disclose components are characterized by string representation and data structure (col. 3, lines 48-51). Therefore, the rejection is proper and maintained herein.

Furthermore, in response to arguments with respect to 103(a) rejections Bates in view of admitted prior art is withdrawn in view of Applicant's argument that

Claims 15, 17, 21 and 23 were rejected under 35 U.S.C. §103 as being unpatentable over Bates in view of alleged admitted prior art. 35 U.S.C. §103 (c) provides that subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. Bates is a patent owned by the Applicant, International Business Machines Corporation. Therefore both the subject patent application and the Bates reference were subject to an obligation of assignment to the same entity at the relevant time and Bates shall not be used under section 103 to preclude the patentability of the subject invention.

Bates is a patent owned by the Applicant, International Business Machines Corporation at the time the invention was made. Therefore, the new ground of rejection to claims 15, 17, 18, 21, 23, and 24 is provided below.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 13, 14, 16, 19, 20 and 22 rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6,360,360 to Bates et al., (hereinafter called Bates).

**Per claim 13:**

Bates discloses:

- A method for minimizing total cost of interaction among at least a pair of components of a computer program, each of the components being characterized by one or more data representation properties, the properties comprising string representation and data structure (col. 3, lines 48-51  
"...programmer first drafts a computer program in human readable form (called source code) prescribed by the programming language, resulting in a source code instruction (or statement) stream..." and col. 2, lines 33-36 "compiler uses a weighted cost function... determine... advantageous... based on an estimate of execution frequency for each function of the object"), the method comprising the steps of:
  - a) carrying out at least a partial run of the program (col. 7, lines 14-15 "During the compilation step" also, FIG. 6 and related discussion);
  - b) monitoring the at least partial run of the program to measure an amount of interaction between each pair of components (col. 7, lines 31-32 "compilation step 330 selects among class implementations by generating a weighted cost function" also, FIG. 6 and related discussion);

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- c) determining a cost of interaction between each pair of interacting components (col. 7, lines 34 "determining a cost for each function of the object" also, FIG. 6 and related discussion);
- d) determining a choice of properties which minimizes total cost of the at least partial run (col. 7, lines 35-36 "determining a function call profile for each object based on estimated execution frequencies" also, FIG. 6 and related discussion);
- e) assigning the choice of the properties to the components for a subsequent at least partial run of the program (col. 7, lines 37-40 "computing a weighted cost for each class implementation based on a numerical relationship between the cost and the function call profile for an object (step 630), and selecting the class implementation that has the lowest weighted cost" also, FIG. 6 and related discussion).

**Per claims 14 and 16:**

The rejection of claim 13 is incorporated, and further, Bates discloses:

- the properties comprising a choice of string representation of a component, the amount of interaction measured in step (b) comprising a frequency of interaction between each pair of interacting components; the cost of interaction comprising a function of the frequency and a cost of converting any differing string representations of the pair to a common string representation (col. 8, lines 16-24 "compiler analyzes... from this analysis determines the number of times each function is issued against each object..., and the loop depth for the object calls...

function call profile is then computed..., and represents an estimate of the frequency... function... executed based on the data gathered" also, See FIG. 7 and related discussion).

**Claim 19** is the computer program product claim corresponding to method claim 13 and rejected under the same rationale set forth in connection with the rejection of claim 13 above.

**Claims 20 and 22** are the computer program product claim corresponding to method claims 14 and 16 respectively, and rejected under the same rationale set forth in connection with the rejection of claims 14 and 16 respectively, above.

### ***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 13, 14, 16, 19, 20, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6,092,180 to Anderson et al. (hereinafter, Anderson).

**Per claim 13:**

Anderson discloses:

A method for minimizing total cost of interaction among at least a pair of components of a computer program, each of the components being characterized by one or more data representation properties, the properties comprising string representation and data structure, the method comprising steps of:

- a) carrying out at least a partial run of the program (col. 5, lines 47-49\* "during execution of the instruction");
- b) monitoring the at least partial run of the program to measure an amount of interaction between each pair of components (col. 5, lines 57-60 "The profile registers can record many useful facts about an instruction's execution... performance information can include: the number of cycles the selected instruction spent in each stage of an execution pipeline, i.e., stage latencies...");
- c) determining a cost of interaction between each pair of interacting components (col. 5, lines 65-67 "On in-order executing processors, it is possible to estimate the total number of stall cycles attributable to each instruction when one is given the fetch-to-retire latencies of sampled instructions");
- d) determining a choice of the properties which minimizes total cost of the at least partial run (col. 6, lines 25-30 "in order to measure useful concurrency, a technique called "pair-wise sampling" is provided. The basic idea is to implement a nested form of sampling. Here, a window of instructions that may execute concurrently with a first profiled instruction is dynamically defined");
- e) assigning the choice of the properties to the components for a subsequent at least partial run of the program (col. 19, lines 22-25 "statistical pair-wise sampling is performed in a nested manner so that for a given selected instruction another instruction that may execute concurrently is directly sampled").



**Per claim 14:**

The rejection of claim 13 is incorporated and further, Anderson discloses:

the properties comprising a choice of string representation of a component, the amount of interaction measured in step (b) comprising a frequency of interaction between each pair of interacting components (col. 14, lines 65-67 "the sampled instructions will not correlate with any specific patterns in the execution of instructions. The size of the interval determines the average frequency of sampling"); the cost of interaction comprising a function of the frequency and a cost of converting any differing string representations of the pair to a common string representation (col. 5, lines 65-67 "in-order executing processors, it is possible to estimate the total number of stall cycles attributable to each instruction when one is given the fetch-to-retire latencies of sampled instructions").

**Per claim 16:**

The rejection of claim 13 is incorporated and further, Anderson discloses:

the data representation property comprising a choice of data structure of a component, the amount of interaction measured in step (b) comprising a frequency of interaction between each pair of interacting components (col. 14, lines 65-67 "the sampled instructions will not correlate with any specific patterns in the execution of instructions. The size of the interval determines the average frequency of sampling"); the cost of interaction comprising a function of the frequency and a cost of converting any differing choices of data structures of the pair to a common choice of data structure (col. 5, lines 65-67 "in-order executing processors, it is

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possible to estimate the total number of stall cycles attributable to each instruction when one is given the fetch-to-retire latencies of sampled instructions").

**Claim 19** is the computer program product claim corresponding to method claim 13 and rejected under the same rationale set forth in connection with the rejection of claim 13 above.

**Claims 20 and 22** are the computer program product claim corresponding to method claims 14 and 16 respectively, and rejected under the same rationale set forth in connection with the rejection of claims 14 and 16 respectively, above.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 15, 17, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson in view of Admitted Prior Art.

#### **Per claim 15:**

The rejection of claim 14 is incorporated, and further, Anderson does not explicitly disclose wherein at least one string represented is selected from ASCII, UNICODE, and EBCDIC.

However, Admitted Prior Art discloses in an analogous computer system wherein at least one string represented is selected from ASCII, UNICODE, and EBCDIC (Applicant's Admitted Prior Art, page 2, lines 12-13 "string representations that can be used include: UNICODE, ASCII, and EBCDIC").

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the method of string represented is selected from ASCII, UNICODE, and EBCDIC as taught in Admitted Prior Art in corresponding to method for measuring latencies by randomly selected sampling of the instructions while the instruction are executed as taught by Anderson. The modification would be obvious because of one of ordinary skill in the art would be motivated include the choice of string representation (i.e., ASCII, UNICODE, and EBCDIC) to provide any string optimization as suggested in Admitted Prior Art (page 2, lines 23-29).

**Per claim 17:**

The rejection of claim 16 is incorporated, and further, Anderson does not explicitly disclose wherein at least one data structure is selected from hash, tree, and compressed data structures.

However, Admitted Prior Art discloses in an analogous computer system wherein at least one data structure is selected from hash, tree, and compressed data structures (Applicant's Admitted Prior Art, page 2, lines 13-14 "data structures that can be used include: trees, compressed files and hash tables").

The feature of data structure is selected from hash, tree, and compressed data structures would be obvious for the reasons set forth in the rejection of claim 15.

**Claims 21 and 23** are the computer program product claim corresponding to method claim 15 and 17 respectively, and rejected under the same rationale set forth in connection with the rejection of claim 15 and 17 respectively, above.

13. Claims 18 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson in view of US Patent No. 5,598,559 to Chaudhuri (hereinafter called Chaudhuri).

**Per claim 18:**

The rejection of claim 13 is incorporated, and further, Anderson does not explicitly disclose wherein the step (d) of determining the choice is carried out by building a graph with nodes representing program components and edges that join adjacent nodes representing interaction therebetween, each edge being characterized by a cost of each interaction, then using a graph cutting technique to find a minimum cut of the graph.

However, Chaudhuri discloses in an analogous computer system wherein the step (d) of determining the choice is carried out by building a graph with nodes representing program components and edges that join adjacent nodes representing interaction therebetween, each edge being characterized by a cost of each interaction, then using a graph cutting technique to find a minimum cut of the graph (col. 1 and 2,

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lines 66-67 and 1-13 "execution plan is a tree data structure... leaf-node is a scan operation... the execution of an operation represented by a given node is always preceded by the execution of the operations represented by the children of the given node... in a relational database management system a query having at least one Group-By operator is optimized... procedure includes the steps of receiving a query having a group-by operator to be optimized, generating for the query execution plans wherein internal nodes representing group-by operations are placed preceding every internal node representing a join operation, considering each such execution plan, and choosing the execution plan having the lowest estimated cost").

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the method of characterizing the join node to minimize the cost for implementing as taught by Chaudhuri into the method for measuring latencies by randomly selected sampling of the instructions while the instruction are executed as taught by Anderson. The modification would be obvious because of one of ordinary skill in the art would be motivated to build nodes to provide more efficient execution as suggested by Chaudhuri (col. 1, lines 41-60).

**Claim 24** is the computer program product claim corresponding to method claim 18 and rejected under the same rational set forth in connection with the rejection of claim 18 above.

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**Conclusion**

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Satish S. Rampuria** whose telephone number is **(571) 272-3732**. The examiner can normally be reached on **8:30 am to 5:00 pm** Monday to Friday except every other Friday and federal holidays. Any inquiry of a general nature or relating to the status of this application should be directed to the **TC 2100 Group receptionist: 571-272-2100**

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Wei Y. Zhen** can be reached on **(571) 272-3708**. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Satish S. Rampuria  
Patent Examiner/Software Engineer  
Art Unit 2191

